

REMARKS

Claim 45 is amended and claims 50 and 53-54 are canceled. Reconsideration of the application in view of the amendments and the remarks to follow is requested.

Claims 63-79 are allowed.

Claims 58-62 are objected to as being dependent upon a rejected base claim.

Claims 42 and 43 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Chan et al. (5,998,860) in view of "Silver," Wikipedia free Encyclopedia or Wagner et al., "Easy Heatsink Mods to Drop CPU Temps," Chron USA or "Cooling Fundamentals: Thermal Conductivity," from FrostyTech.com. Claim 44 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Chan et al. in view of "Silver," Wikipedia free Encyclopedia or Wagner et al., "Easy Heatsink Mods to Drop CPU Temps," Chron USA or "Cooling Fundamentals: Thermal Conductivity," from FrostyTech.com and further in view of Chen et al. (6,215,180). Claims 45, 49-51, 53, 55 and 56 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Chan et al. in view of Chen et al. Claims 46-48 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Chan et al. in view of Chen et al. and further in view of Tummala et al., Microelectronics Packaging Handbook, Semiconductor Packaging - Part II, 2nd Edition, pages 898-901. Claims 52 and 54 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Chan et al. in view of Chen et al. and

further in view of Wang et al. (6,226,140). Claim 57 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Nakashima et al. (5,661,086) in view of Chen et al. and Wang et al.

Regarding the rejection against independent claim 42 based upon the combination of Chan and the three articles listed above, such claim recites forming a thermally conductive material over at least a portion of a die, the material comprising a thermal conductivity greater than that of elemental copper. The Examiner correctly states that Chan fails to teach a material comprising a thermal conductivity greater than that of elemental copper, and relies on the three articles to teach the use of silver as having a greater thermal conductivity (page 4 of paper no. 104). The Examiner states that it would be obvious to use silver in the inventions of Chan because they all teach that silver has a higher thermal conductivity than copper, is an art recognized equivalent to copper (and therefore a substitute) and is the ideal material for ultra-efficient heat sinks referring to the FrostyTech article at page 2 (pages 4-5 of paper no. 104).

However, teachings to silver as having a higher thermal conductivity than copper and as the ideal material for ultra-efficient heat sinks is not enough to provide a motivational rationale for modifying the Chan invention, particularly when considering the articles in their entirety. While the articles do teach that silver has a greater thermal conductivity than copper, the articles also teach that silver is not a recognized equivalent to copper (and therefore not a substitute) because the use of silver is cost prohibitive. For example, FrostyTech states, "silver

would be the ideal material for ultra-efficient heat sinks, but is cost prohibitive. Copper offers the best solution, at a fraction of the cost” (page 2) (emphasis in the article). The Easy Heatsink article states, “if we only care about the performance, silver is the winner. If it is all about costs, aluminum is the choice. The best price/performance is clearly copper...” (page 2). Finally, the Silver article states, “it [silver] has the highest electric conductivity of all metals, even higher than copper. But it’s greater cost has prevented it from being widely used in place of copper for electrical purposes” (page 1) (emphasis in the article). Consequently, considering each reference in its entirety, silver is not a recognized equivalent to copper, and therefore, there is no motivation to use silver in the Chan inventions because silver is cost prohibitive.

Respectfully, the Examiner is reminded that the Federal Circuit has stated that it is impermissible to pick and choose from any one reference only so much of it as will support a given position to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one skilled in the art. *see, e.g., Baush and Lomb, Inc. vs. Barnes-Hind/Hydrocurve, Inc.*, 796 F.2d 443, 230 USPQ 416, 420 (Fed. Cir. 1986) (*citing W. L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1550, 220 USPQ 303, 311 (Fed. Cir. 1983)) *see also, Panduit Corp. v. Dennison Manufacturing Co.*, 810 F.2d 1561, 1 USPQ2d 1593, 1597 (Fed. Cir. 1987) (citations omitted) (“[a] prior patent must be considered in its entirety, *i.e.*, as a *whole*, including portions that would lead away from the invention”). Considering the articles in their entirety, the alleged

motivational rationale presented by the Examiner to modify the Chan invention to use silver as a substitute does not exist, and therefore, the obviousness rejection against claim 42 fails for lack of a proper motivational rationale. Consequently, the combination of art fails to teach or suggest a material comprising a thermal conductivity greater than that of elemental copper as positively recited in claim 42. Since the combination of art fails to teach a positively recited limitation of claim 42, claim 42 is allowable.

Moreover, the teaching by the three articles that use of silver is cost prohibitive is effectively a "teaching away" from the use silver for the Chan invention. Respectfully, the Examiner is reminded that the Federal Circuit has stated that "teaching away" is the antithesis of the art suggesting that a person of ordinary skill would go in the claimed direction. Essentially, teaching away from the art is a *per se* demonstration of lack of obviousness. *In re Dow Chemical Co.*, 837 F.2d 469, 5 USPQ2d 1529 (Fed. Cir. 1988). Pursuant to this Federal Circuit authority, the teaching of the articles to the prohibitive cost of silver is a teaching away of using silver in the Chan invention, and therefore, is a *per se* demonstration of lack of obviousness. Therefore, the obviousness rejection against claim 42 fails and should be withdrawn. For this additional reason, claim 42 is allowable.

Claims 43-44 depend from independent claim 42, and therefore, are allowable for the reasons discussed above with respect to the independent claim,

as well as for their own recited features which are not shown or taught by the art of record.

Independent claim 45 stands rejected as being obvious over the combination of Chan and Chen. Such claim is amended to recite a metal foil having segments comprising overlapping portions joined in contact with each other. Support for the amendment language is provided by an exemplary embodiment of Applicant's invention at, for example, Fig. 18. The art of record, singularly or in any combination, fails to teach or suggest segments comprising overlapping portions joined in contact with each other as positively recited in claim 45. Since the art of record fails to teach or suggest a positively recited limitation of claim 45, claim 45 is allowable.

Claims 46-49, 51-52 and 55-56 depend from independent claim 45, and therefore, are allowable for the reasons discussed above with respect to the independent claim, as well as for their own recited features which are not shown or taught by the art of record.

Independent claim 57 stands rejected as being obvious over the combination of Nakashima, Chen and Wang. Such claim recites adhering a semiconductive-material-comprising die to a metal foil **and** a substrate. The Examiner correctly states that Nakashima fails to teach a die adhering to both a metal frame and a circuit frame, and provides Chen to allegedly teach this limitation. First, the Examiner states the Fig. 1 structure of Chen is similar to the Nakashima structure, that is, a die that is not adhered to both a metal frame

and a circuit frame (page 9 of paper no. 104). Next, the Examiner points to the Fig. 2 structure of Chen to teach a die adhered to both a metal frame and a circuit frame, and then states that since Chen teaches the Fig. 2 structure is an alternative to the Fig. 1 structure, it would be obvious to one skilled in the art to use the method of Nakashima to form the Fig. 2 structure of Chen (page 9 of paper no. 104).

However, this proposed modification to the Fig. 2 structure of Chen would result in a structure that does not teach all the recited limitations of claim 57. For example, claim 57 further recites providing an insulative substrate having circuitry thereon and an opening therethrough and electrically connecting circuitry supported by the die to circuitry on the substrate with a plurality of **electrical interconnects extending through the opening**. Chen teaches that the Fig. 2 structure is designed specifically as an alternative to the Fig. 1 structure **not to include the wires and wire bonding** of the Fig. 1 structure (col. 1, Ins. 55-65). That is, Chen teaches that the Fig. 2 structure is designed specifically to replace wires and wire bonding with leads 222 taped to bonding pads 211 to save production time and cost (col. 1, Ins. 55-65). Consequently, the modification of the Chen invention as suggested by the Examiner with teachings by Nakashima would not include wires and wire bonding. Accordingly, it is inconceivable that the combination of art could teach or suggest a plurality of electrical interconnects extending through the opening as positively recited in claim 57.

Since the art of record fails to teach or suggest a positively recited limitation of claim 57, claim 57 is allowable.

Moreover, to modify the Chen structure of Fig. 2 to have wires would render the structure unsatisfactory for its intended purpose, that is, to save production time and cost. The Examiner is respectfully reminded that if a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. MPEP §2143.01 (8th Edition) *citing to In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). Pursuant to this authority, since the proposed modification to Chen would render the Fig. 2 structure unsatisfactory for its intended purpose, there is no suggestion or motivation to make the proposed modification. Without the required motivation to make the modification, the obviousness rejection fails and should be withdrawn. For this additional reason, claim 57 is allowable.

Furthermore, to modify the Chen structure of Fig. 2 to have wires would change the principal of operation in the Fig. 2 structure. The Examiner is respectfully reminded that if the proposed modification or combination of the prior art would change the principal of operation in the prior art invention being modified, then the teachings of the reference are not sufficient to render the claims *prima facie* obvious. MPEP §2143.01 (8th Edition) *citing to In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959). The court in *In re Ratti* reversed a rejection holding the "suggested combination of references would require


substantial reconstruction and redesign of elements shown in the [primary reference] as well as a change in the basic principle under which the [primary reference] construction was designed to operate” 270 F.2d at 813, 123 USPQ at 352. Pursuant to this authority, since modifying the Chen structure by Nakashima will change the basic principle under which the Chen construction was designed to operate, that is, from a circuitry connection of leads taped to bonding pads to wires and wire bonding, then the teachings of the references are not sufficient to render claim 57 *prima facie* obvious. Consequently, the obviousness rejection against claim 57 is improper and should be withdrawn. Claim 57 is allowable.

Claims 58-62 depend from independent claim 57, and therefore, are allowable for the reasons discussed above with respect to the independent claim, as well as for their own recited features which are not shown or taught by the art of record.

This application is now believed to be in immediate condition for allowance, and action to that end is respectfully requested. If the Examiner's next anticipated action is to be anything other than a Notice of Allowance, the undersigned respectfully requests a telephone interview prior to issuance of any such subsequent action.

Respectfully submitted,

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